

# Claims

- [c1] A method for fabricating a flip-chip semiconductor device having plural conductive polymer bumps thereon, the method comprising:
- patterning and depositing metallized pads on a substrate;
  - photolithographically forming plural molds on the substrate using a photoresist, wherein the plural molds are in registration with the metallized pads;
  - filling each of the plural molds by applying a low-viscosity conductive polymer material;
  - spinning the substrate to form a uniformly distributed conductive polymer layer;
  - baking the substrate, plural molds, and conductive polymer material to thicken any remaining conductive polymer material and evaporate any solvent in the conductive polymer layer;
  - polishing the conductive polymer layer to remove excess conductive polymer material from a surface of the photoresist;
  - stripping the plural molds to reveal the plural conductive polymer bumps; and
  - hardening the plural conductive polymer bumps by tem-

perature curing.

- [c2] The method of claim 1, wherein the photoresist is a negative resist.
- [c3] The method of claim 1, wherein the photoresist is a positive resist.
- [c4] The method of claim 1, further comprising, after polishing the conductive polymer layer, fine polishing the conductive polymer layer using a grid having a grain size smaller than a first grain size used in polishing the conductive polymer layer.
- [c5] The method of claim 1, wherein baking the substrate is accomplished at a temperature in a range of approximately 70C–120C.
- [c6] The method of claim 1, wherein stripping the plural molds is accomplished using a resist remover.
- [c7] The method of claim 1, wherein the temperature curing is accomplished at a temperature in the range of approximately 190C–230C.
- [c8] The method of claim 1, wherein the temperature curing is accomplished at a temperature of approximately 190C for about 30 minutes.

- [c9] The method of claim 1, wherein the temperature curing is accomplished at a temperature equal to or greater than a glass transition temperature of the conductive polymer.
- [c10] A method for fabricating a flip-chip semiconductor device having high aspect ratio plural conductive polymer bumps thereon, the method comprising:  
forming plural molds on a substrate using a photolithographic technique;  
filling the molds by spinning a layer of conductive polymer material onto the substrate;  
polishing the conductive polymer material layer to remove excess conductive material from a surface of the substrate; and  
exposing the plural conductive polymer bumps by removing the plural molds from the substrate.
- [c11] An integrated semiconductor package produced by the method of any one of claims 1–10, the package comprising a plurality of conductive polymer bumps electrically connected to respective under bump metallization contacts, wherein the under bump metallization contacts are operatively connected to a semiconductor device.